Not All Efficacy Testing is Created Equal: Effect of Variation in Test Methods on Performance of an Ultraviolet Radiation Room Disinfection Device

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Background

- Ultraviolet (UV-C) room disinfection devices are commonly used in hospitals as an adjunct to standard manual cleaning
- In contrast to EPA-registered surface disinfectants, there are currently no standard test methods for evaluation of UV-C disinfection

Objective

- To test the hypothesis that variations in test methods might have a significant impact on the measured efficacy of UV-C devices

Methods

- Unless otherwise indicated, all test carriers were placed horizontal at a distance of 3 feet relative to the lamps and at a height of 4 feet with a 5-minute treatment time
- Test organisms: methicillin-resistant Staphylococcus aureus (MRSA) and Clostridium difficile spores
- Test device: Clorox Healthcare™ Optimum-UV™ System
- Test variables: type of carrier (glass slides, steel disks, formica, plastic, cotton, and polyester), spreading of the inoculum (4 mm radius with no spreading, 10 mm spread, 22 mm spread), carrier angle relative to the device, and type of organic load
- Organic load: 5% fetal calf serum and 5% tryptone, 0.4% mucin, and 5% bovine serum albumin (i.e., ASTM E2197 standard)

Results

- On steel carriers, spreading of the inoculum over a larger surface area significantly increased reduction of pathogens (p<.001) (Fig. 1)
- On glass slides, spread of the inoculum occurred naturally, resulting in increased log reductions versus non-spread steel disks
- 22 mm steel carriers with a spread inoculum were positioned vertically (i.e., directly facing the lamp) had greater log reductions than carriers positioned horizontal to the lamps (p≤.01) (Fig. 2)
- Log reductions were similar on steel, formica, plastic, and glass slides when the inoculum was spread over the same area, whereas cotton and polyester had significantly lower levels of reduction (Data not shown)
- 5% fetal calf serum had less impact on UV efficacy than the ASTM standard organic load (p<.001) (Fig. 3)

Conclusions

- Variation in test methods can have a major impact on measured reductions in pathogens by UV-C devices
- Our findings highlight the need for standardized methods for testing the efficacy of UV-C devices

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References